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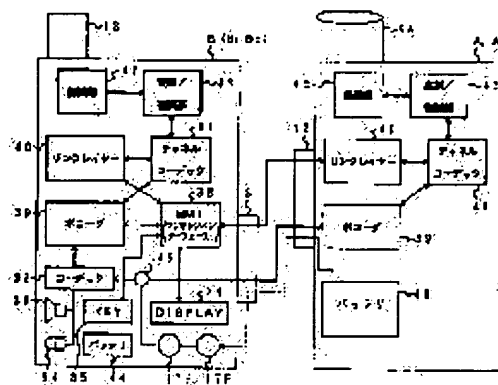
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(54) DUAL MODE MOBILE RADIO TERMINAL

(57)Abstract:

PROBLEM TO BE SOLVED: To avoid inconvenience that the user always has to carry a large sized terminal by mechanically coupling a mobile satellite communication terminal and a ground wave portable terminal and connecting electrically a voice conversion section at a terminal side of the ground wave portable terminal and a mobile satellite communication terminal function of a main body terminal side when they are coupled.

SOLUTION: An iridium main body terminal A and a ground wave portable terminal B are mechanically coupled to connect electrically a connector section 3 of the terminal B and a connector container section 12 of the terminal A. PCM data from a CODEC 37 at the side of the portable terminal B are sent to a VOCODER 39 of a side of the main body terminal A via the connector section 3, and data of an MMI 38 at a side of the ground wave portable terminal B are sent to a link layer 40 at a side of the main body terminal A. Electric coupling of the connector section 3 is detected by a detection circuit at the side of the portable terminal B, a selection key 17F is depressed to light a selection key LED 17f, and a permission circuit 45 at an output side of the CODEC 37 sends the PCM data from the CODEC 37 to the main body terminal A via the connector section 3.



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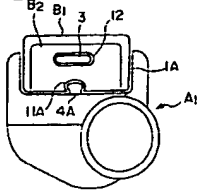
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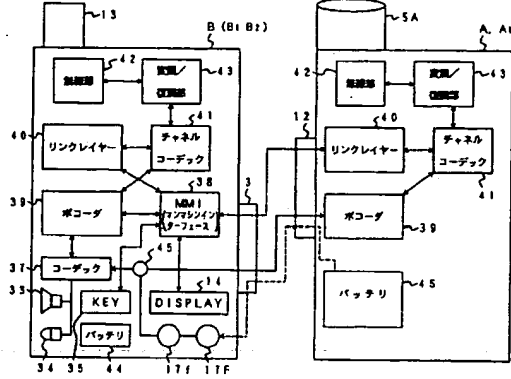
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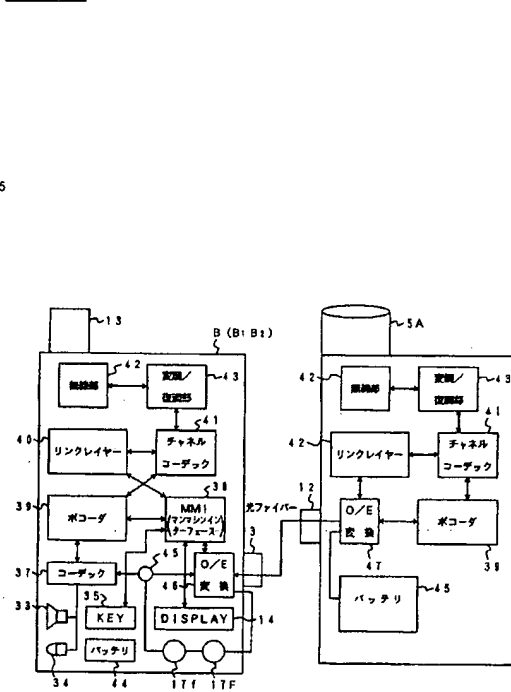
[Drawing 4]



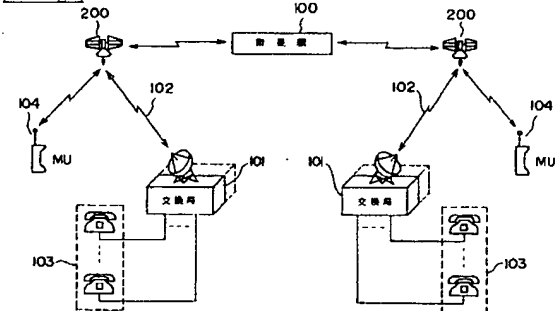
[Drawing 5]



[Drawing 6]



[Drawing 7]



[Drawing 8]



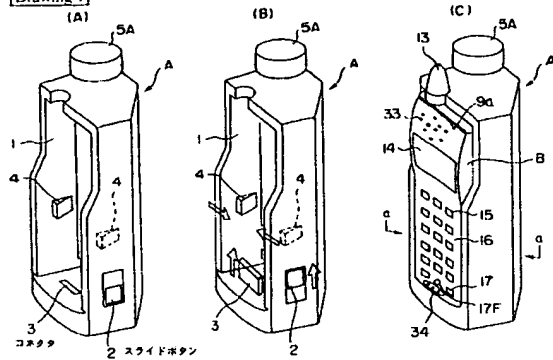
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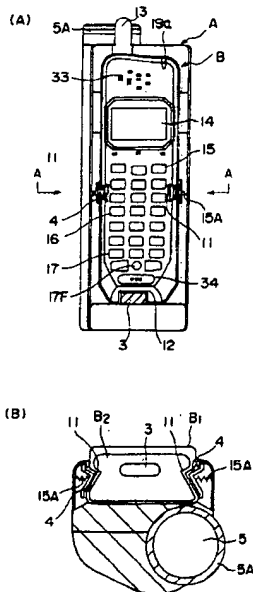
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DRAWINGS

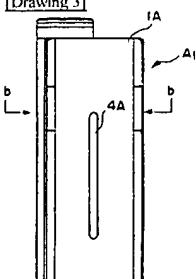
[Drawing 1]

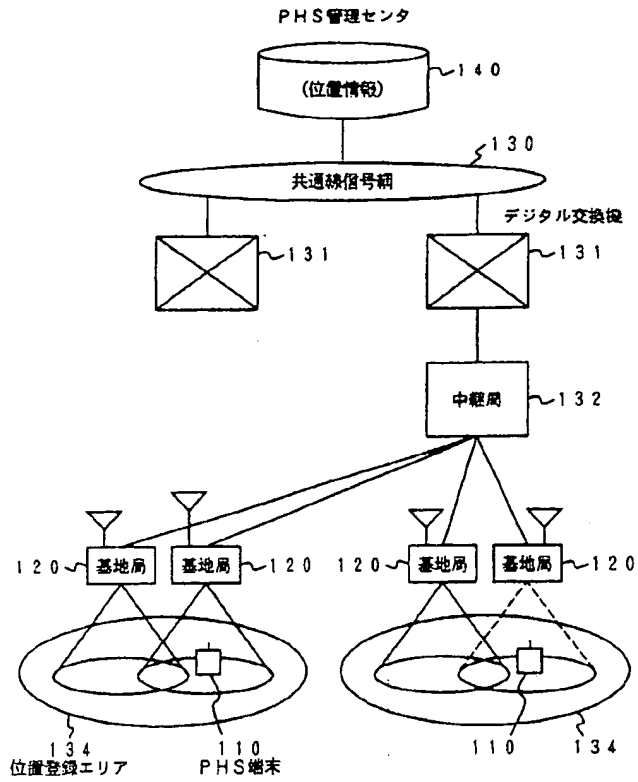


[Drawing 2]



[Drawing 3]





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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] The dual mode formula mobile radio terminal concerning the 1st operation gestalt of this invention is shown, and the state where (A) collapsed the connector area of an iridium main part terminal, the state where (B) upheaved the aforementioned connector area, and (C) are the perspective diagrams showing the state where the iridium main part terminal was made to equip with a personal digital assistant.

[Drawing 2] It is the a-a line cross section with which (A) omitted the front view of drawing 1 (C) which contains a notch in part, and (B) omitted the internal mechanism of drawing 1 (C).

[Drawing 3] It is the front view showing the dual mode formula mobile radio terminal concerning other operation gestalten of this invention.

[Drawing 4] It is the b-b line cross section which omitted the internal mechanism concerning the state where drawing 3 was equipped with the personal digital assistant.

[Drawing 5] It is the internal-block view of a personal digital assistant B and the iridium main part terminal A used for the operation gestalt of each above.

[Drawing 6] It is the internal-block view of a personal digital assistant B and the iridium main part terminal A used for the operation gestalt of each above constituted so that signal **** might be carried out by the optical fiber through the electrical and electric equipment / phototransducers 46 and 47.

[Drawing 7] The iridium move terminal system which uses the satellite network on a circumference orbit as a network switching node is shown.

[Drawing 8] It is explanatory drawing explaining the well-known mobile communication system for PHS.

[Description of Notations]

- A Main part terminal
- 1 Crevice Space
- B Personal digital assistant
- 2 Slide Button
- 3 Connector Area
- 4 Engagement Heights
- 12 Connector Stowage
- 33 Receiver Section Loudspeaker
- 14 Display
- 15 Telephone Call Key
- 16 Ten Key
- 17 Function Key
- 17F Selection key
- 34 Microphone
- 33 Loudspeaker
- 35 Key Stroke and Control Section
- 37 Codec
- 38 MMI (Man Machine Interface)
- 39 Vocoder
- 40 Link Layer
- 41 Channel Codec
- 42 Non-Line Part
- 43 Modulation/Recovery Section
- 44 45 Battery

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] It is related with the mobile radio terminal of the dual mode formula applicable also as ground wave move terminals, such as a cellular formula using the base transceiver station of a ground wave, and a PHS formula, as the so-called mobile satellite communication terminal which uses the satellite on an orbit as a network switching node.

[0002]

[Description of the Prior Art] As an example of mobile satellite communication, the IRIDIUM Plan of U.S. Motorola, Inc. etc. is known conventionally. the communication system of an IRIDIUM Plan is shown in JP,6-181456,A -- as -- the composition -- drawing 7 -- being based -- explaining -- the satellite network 100 (constellation) -- 66 sets of for example, the satellites 200 -- the surroundings of the earth (not shown) -- it is comparatively arranged on the low orbit With such a satellite network 100, it can foresee from the arbitrary points of the surface of the earth directly to at least one of the satellites, and radio (line-of-sight communication) can be performed. The satellite network and the satellite are always moving to the earth for a low orbit. For example, when the satellite is arranged from the earth at the orbit of the 765km sky, the satellite high up in the sky is moving by about 25,000km/o'clock in speed to one point of surface of the earth. For this reason, a satellite goes into the field of view of one point of surface of the earth in the period for the maximum about 9 minutes.

[0003] Moreover, on the surface of the earth, much subscriber's-line exchanges 101 (switching office:SO) are arranged for each area or every country, and the satellite and data communication which satellites adjoin through RF trunk communication link 102 (trunking communication link) are performed. Moreover, the satellite is performing data communication mutually through the trunk communication link.

[0004] Therefore, the exchange 101 can control the communication (call) sent out to an any selected point in any area on the earth through the satellite network 100 of a satellite. The exchange 101 can send out the call which can combine with the general telephone-exchange network (PSTN) 103 through many PSTN circuits, and can receive the call sent out to the subscriber 104 of a PSTN circuit to a mobile satellite communication circuit, and is sent to the PSTN circuit 103 by the subscriber 104 of a mobile satellite communication circuit. Moreover, the mobile satellite communication circuit contains arbitrary numbers of millions of mobile satellite communication terminals MU. Communication in the arbitrary places of the earth under a mobile satellite communication line network within the limits is possible for the mobile satellite communication terminal MU.

[0005] On the other hand, as a ground wave move terminal, it is explaining the mobile communication system for PHS (personal handyphone system) with which this invention shown in drawing 8 is involved from the PHS management center 140 which memorizes positional information, the relay center 132 by which cable connection was made through the highway signal network 130 and the digital exchange 131, and two or more base stations 120 by which cable connection was made in this relay center 132, and the aforementioned relay center 132 creates the positional information based on the position registration demand from a base station 120. And the position registration in this equipment receives the positional information first reported to a PHS terminal 110 side from a base station 120, and when it differs from the position registration information memorized by PHS terminal 110, it sends out a position registration signal to the base station 120 of the radio zone (position registration area 134) in which he is present from PHS terminal 110. Via a relay center 132, this position registration signal turns into a position registration signal changed into the form required for switching, and arrives at the PHS management center 140, and the positional information of present PHS terminal 110 is memorized in this PHS management center 140. This operation is repeated, whenever PHS terminal 110 moves and the position registration area 134 changes.

[0006] And if the number of PHS terminal 110 is dialed from a general telephone station for example, in the digital exchange 131 of an origination side, position registration information required for exchange will be asked for whether PHS terminal 110 corresponding to a dial is in the PHS management center 140 through the highway signal network 130 in which position registration area 134. Trace connection is made based on this positional information, and simultaneous call processing by ground wave radio is performed from each base station 120 of the corresponding position registration area 134.

[0007] Moreover, if a general subscriber phone number is dialed from PHS terminal 110, after the authentication information number to which each PHS terminal 110 corresponds will be transmitted to a relay center 132 through a base station 120 with the telephone number, recognition of PHS terminal 110 will be performed in this relay center 132 and an addresser will check whether you are a contractor, it connects to an ordinary subscriber's telephone.

[0008]

[Problem(s) to be Solved by the Invention] Therefore, although communication in the arbitrary places on the earth under a mobile satellite communication line network is possible, since the satellite network used as a network switching node is arranged from the earth at the orbit of the 765km sky, on the other hand, the high power which an electric wave reaches even to a satellite network is

required for the aforementioned mobile satellite communication terminal. Therefore, it is not only avoided that not only the sending circuit but a cell power supply becomes large, but in a mobile satellite communication terminal, communication cost and cell exhaustion become large.

[0009] Although there is limit that said ground wave move terminals, such as PHS and cellular one, can communicate only in predetermined area on the other hand, in order to communicate by communication with a near base station, both a sending circuit and the cell power supply of a mobile satellite communication terminal are conversely small, and communication cost and cell exhaustion are also small, and end. The mobile radio terminal of the dual mode formula which built in said two terminal capabilities, mobile satellite communication terminal capabilities and ground wave move terminal capabilities, can be offered. However, even if it is the situation (only the service range of cellular ones or PHS) which is using only ground wave move terminal capabilities, unlike always carrying a heavy large dual mode terminal, and carrying the small terminal of these days, a big burden will be applied to a user.

[0010] Moreover, although the terminal which used the ground wave functional division (a non-line part, the program concerning control of a communication mode, memory of data) as the cartridge type, and made the desorption of it possible is also examined in order to throw in a dual mode terminal with various kinds of ground wave move terminal methods and to avoid this according to the area used selling, in carrying out world expansion like mobile satellite communication, walking with an always big terminal does not have a change. this invention aims at offering the dual mode terminal which can solve the starting technical technical problem.

[0011]

[Means for Solving the Problem] In the dual mode formula mobile radio terminal with which invention according to claim 1 comes to have the mobile satellite communication terminal capabilities using the satellite on an orbit, and ground wave move terminal capabilities The main part terminal section which comes to have the mobile satellite communication terminal capabilities except the voice transducer which contains the key stroke section, a display, a microphone, and a loudspeaker at least, It has the ground wave personal digital assistant section which comes to have the ground wave move terminal capabilities which are equipped with the voice transducer containing the aforementioned key stroke section, a display, a microphone, and a loudspeaker, and are made into the purpose. While preparing the engagement crevice and engagement heights which connect between the sections mechanically in the aforementioned end of ends in each terminal section The voice transducer which contains the key stroke section, the display, microphone, and loudspeaker by the side of the ground wave personal digital assistant section at the time of the aforementioned connection, and the mobile satellite communication terminal-capabilities section by the side of the main part terminal section are characterized by preparing the connector area connected electrically in each terminal section.

[0012] According to this invention, it can have the cell power supply which became independent to all of the main part terminal section which comes to have a ground wave personal digital assistant and mobile satellite communication terminal capabilities, only a small ground wave personal digital assistant can be taken out in a ground wave service field, and only this can be carried and used. In this case, by the aforementioned ground wave personal digital assistant removal being interlocked with, and a main part terminal section side's awaiting, and cutting a state, the cell exhaustion by the side of the main part terminal section is avoidable. Moreover, when moving in addition to a ground wave service field is expected At the same time it connects the personal digital assistant section to the main part terminal section mechanically The key stroke section, display, and voice transducer by the side of the personal digital assistant section, It connects electrically and, thereby, the mobile satellite communication terminal-capabilities section by the side of the main part terminal section becomes possible [using it as a mobile satellite communication terminal anywhere / terrestrial] using the aforementioned key stroke section and a display.

[0013] Moreover, since the telephone directory which the functions (call sound etc.) set up in the ground wave personal digital assistant could use in common, and has been registered into the internal memory can also be used in common when the telephone number memory for call origination is built in a ground wave personal digital assistant and it performs satellite communication by preparing the key stroke section, a voice transducer, etc. in a ground wave personal digital assistant side, the time and effort registered separately is unnecessary.

[0014] Moreover, when the number of the connector areas according to claim 2 which perform the aforementioned electrical installation was one, and it was the personal digital assistant whose connecting location of the aforementioned connector area corresponds when the engagement width of face prepares two or more engagement sections in which adjustable is possible and mechanical connections are performed to a business trip like cellular, arbitrary personal digital assistants, for example, PHS, selection or overseas even if it was two or more sorts of personal digital assistants with which the configurations (engagement width of face) differ, installation of the personal digital assistant of each country is attained.

[0015] Furthermore, while forming the engagement section according to claim 3 which performs the aforementioned mechanical connections like in the shape of [which can move to predetermined shaft orientations] a rail By arranging the connector area which performs electrical installation to the termination side of the move shaft orientations of the aforementioned engagement section, and arranging the aforementioned connector area on the position regulation side of the aforementioned move shaft While installation of the personal digital assistant of what configuration will be attained if it is the personal digital assistant whose connecting location of the aforementioned connector area corresponds, and the rail-like crevice is formed in the tooth-back side Since the aforementioned connector area is located on a position regulation side, while positive connector connection is attained, a connector area is not damaged in order to get a shock in the case of desorption in respect of position regulation.

[0016]

[Embodiments of the Invention] Hereafter, with reference to a drawing, the suitable example of this invention is explained in detail in instantiation. However, the size of the component part indicated by this example, the quality of the material, a configuration, its relative arrangement, etc. are not the meaning that limits the range of this invention to it but only the mere examples of explanation, as long as there is no specific publication especially. The main part terminal with which drawing 1 shows the dual mode formula mobile radio terminal concerning the operation gestalt of this invention, and A comes to have the iridium terminal capabilities except the voice transducer which contains the key stroke section, a display, a microphone, and a loudspeaker at least, and B are personal digital

assistants which come to have well-known ground wave move terminal capabilities, such as PHS and cellular one. The whole region is covered mostly, the crevice space 1 is formed in the shape of a cross-section rectangle, and the main part terminal A constitutes the shape of a method object of abbreviation vertical-mold length to this crevice space 1 possible [receipt of the personal digital assistant B of nothing and a front wall surface which are PHS, cellular, etc.]. By vertical operation of the slide button 2 prepared in the crevice space 1 aforementioned base at the outside side attachment wall, while a connector area 3 consists of aforementioned base positions possible [upheaval and descent], the spring force is resisted at right-and-left both the internal-surfaces side of the aforementioned crevice space 1, and the engagement heights 4 of the couple which can be rocked in the extension direction are formed.

[0017] As shown in drawing 2, engagement heights 4 nose of cam engages the shape of an abbreviation right triangle of a nose-of-cam wedge shape with the engagement crevice 11 by the side of a personal digital assistant B by energizing spring 15A from nothing and the interior, and the engagement heights 4 are constituted so that position fixation may be carried out. Moreover, the height to the nose-of-cam cuneus of the aforementioned engagement heights 4 is constituted possible [installation of the personal digital assistant B with which it is arbitrarily set up, for example, PHS differs from two or more sorts of cellular configurations (width of face)]. That is, it is a premise that the position of the personal digital assistants [, such as PHS and cellular one,] B used for this operation gestalt of the connector stowage 12 cut in a bottom side and the engagement crevice 11 into which the nose-of-cam cuneus of the aforementioned engagement heights 4 prepared in the right-and-left both-sides side fits corresponds, and as this shows with the fictitious outline of drawing 2, installation of the personal digital assistant B1 and B-2 from which a configuration (width of face) differs is attained.

[0018] In addition, in this operation gestalt, a part of aforementioned upper wall is cut and lacked from the crevice space 1 aforementioned upper wall for the composition on which the antenna 13 of a personal digital assistant B can protrude. Moreover, the cross-section configuration of the main part terminal A section is operating this cylinder frame 5A as an antenna while turning a posterior-wall-of-stomach side to one side, and it bulging it and forming in the bulge section the cylinder space 5 which can contain a large-sized cell.

[0019] Although it is as having described above to have the connector stowage 12 cut in a bottom side and the engagement crevice 11 established in a right-and-left both-sides side, the personal digital assistants B used for this operation gestalt on the other hand, such as PHS and cellular one While making a upper-limb left part set up an antenna 13, the receiver section loudspeaker 33 is formed in arrival-of-the-mail lamp 19a and the front face of the upper part at a upper limit, and the display 14 which displays various information including the transmit information by operation of a key etc. is formed in the bottom of it. Moreover, the ten key 16 and the function key 17 which consists of a key for realizing the various functions of volume control and a selection of function, and others to the bottom of it are further arranged by the front lower part at the telephone call key 15 constituted by the electric power switch, the telephone call switch which transmits a call origination signal, the on-hook switch, etc., and the bottom of it. And selection key 17F which choose an iridium circuit with the aforementioned function key 17 are prepared. and -- this -- pressing selection key 17F -- this -- key 17F carry out Light Emitting Diode lighting, and tell that it is in an iridium line connection state 34 is a microphone.

[0020] And the aforementioned selection key 17F are controlled electrically to switch on the light, only when the connector area 3 by the side of the main part terminal A section is combined electrically. The nose-of-cam cuneus of the aforementioned engagement heights 4 fits in with the engagement crevice 11 established in the flank of a personal digital assistant B, the engagement heights 4 of the couple which protrudes on right-and-left both walls both-sides side of the aforementioned crevice space 1 by pushing in the target personal digital assistant B resisting the spring force, and extension-izing by downward operation of the slide button 2 in the state where of the connector area 3 was made buried in the aforementioned base position, according to this operation gestalt. And by vertical operation of the aforementioned slide button 2 after engagement, a connector area 3 upheaves from the aforementioned base position, it rushes in into the connector stowage 12 cut in a bottom side, and position fixation is carried out. According to this engagement fixed means, the positive fixation of the aforementioned end of ends is attained by three-point support.

[0021] Drawing 3 and drawing 4 show the dual mode formula mobile radio terminal concerning other operation gestalten of this invention. While a personal digital assistant B constitutes the shape of a method object of abbreviation vertical-mold length from the upper part possible [slide insertion], without covering the whole region mostly, forming crevice space 1A in the shape of a cross-section rectangle, and preparing the upper wall of nothing and a front wall surface which is this crevice space 1A, the main part terminal A1 While installing rail-like salient 4A of a cross-section reverse trapezoidal shape in the aforementioned crevice space 1A tooth back perpendicularly, the connector area 3 is upheaved in the aforementioned base position. On the other hand, rail-like engagement crevice 11A which carries out fitting sliding is prepared in the personal digital assistant B side, such as PHS and cellular one, at the aforementioned rail-like salient 4A, and the connector stowage 12 is cut in the bottom side.

[0022] Making rail-like salient 4A and rail-like crevice 11A fit in, by carrying out slide insertion and carrying out downward operation of the personal digital assistant B into the crevice space 1, from the upper part, into the aforementioned connector stowage 12, a connector area 3 is rushed in and, according to this operation gestalt, position fixation is carried out. When the position of rail-like crevice 11A into which the connector stowage 12 and rail-like salient 4A which are cut in a bottom side fit is in agreement, as the fictitious outline of drawing 4 shows the personal digital assistants B used for this operation gestalt, such as PHS and cellular one, while installation of the personal digital assistant B1 and B-2 from which a configuration (width of face) differs is attained, it becomes possible to certainly fix A and B by second page support of a base and a tooth back in the aforementioned end of ends.

[0023] Next, drawing 5 is an internal-block view of a personal digital assistant B and the iridium main part terminal A used for the operation gestalt of each above. MMI38 (man machine interface) which performs user interface processing of the microphone 34 in drawing, a loudspeaker 33, a key stroke and a control section (included built-in telephone directory memory) 35, a display 14, the codec 37 that performs conversion or its reverse conversion for an analog sound signal to PCM data, key control, display control, etc. exists only in a personal digital assistant B side. Moreover, the terminal-capabilities circuit required to transmit/receive the PCM data from the aforementioned codec 37 through an iridium circuit is established in the main part A side of an iridium terminal, and, on the other hand, the ground wave terminal-capabilities circuit required to transmit / receive the PCM data from the aforementioned codec 37 between base stations is established in the personal digital assistant B side, respectively.

[0024] Namely, this operation gestalt is the radio control section for communicating by the vocoder 39 which performs compression of the aforementioned PCM data, and extension, and radio. To the data from the link layer 40 and the aforementioned link layer 40 which are divided into a hierarchy (Layer) according to the role to control, or a vocoder 39, a preamble, Add unique WORD, an error correction, a detection sign, etc., and it has the setting up function of the radio channel of the channel codec 41 changed into the frame format of an iridium circuit or a ground wave circuit, the aforementioned iridium circuit, or a ground wave circuit. It restores to the analog signal from the non-line part 42 and the aforementioned radio section 42 which are changed into a predetermined radio frequency to digital data. The wave data of choice were extracted through a band limit filter and AGC, and the digital data from the channel codec 41 was modulated, and modulation/recovery section 43 restricted to a band [minimum required] through a band limit filter is formed in each terminal. In addition, a dry cell, a lithium ion battery, a nickel hydoride battery, etc. are used, and batteries 44 and 45 are contained by each terminal.

[0025] And the mechanical combination with the main part terminal A and personal digital assistant B which described this operation gestalt above connects electrically, and, as for MMI38 data by the side of a personal digital assistant B, a connector area 3 and the connector stowage 12 can transmit the PCM data from the codec 37 by the side of a personal digital assistant B to the vocoder 39 by the side of the main part of a terminal through a connector again at the link layer 40 (radio control section) by the side of the main part of a terminal, respectively by it. Moreover, while selection key Light Emitting Diode 17f lights up by detecting the electrical coupling of the aforementioned connector in the detection circuit by the side of a personal digital assistant B, and pushing selection key 17F, transmitting the PCM data from a codec 37 to the main part terminal A side through a connector area 3 by the permission circuit 45 of codec 37 output side is permitted. In addition, you may constitute the aforementioned electrical installation so that signal **** may be carried out by the optical fiber through the electrical and electric equipment / phototransducers 46 and 47, as shown in drawing 6 .

[0026]

[Effect of the Invention] Above, according to [like / a publication] this invention, when said two terminal capabilities, mobile satellite communication terminal capabilities and a ground wave communication terminal function, can be used alternatively and it uses only a ground wave personal digital assistant, it is not necessary to carry a heavy large terminal like the conventional dual mode terminal, and a big burden is not applied to a user. Moreover, this invention can be used according to the area used selling, exchanging it for the terminal of the ground wave personal digital assistant of each country or an every place region easily, when carrying out world expansion like a different ground wave personal digital assistant like PHS or cellular one, and iridium, since use of two or more sorts of ground wave personal digital assistants is possible.

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CLAIMS

[Claim(s)]

[Claim 1] In the dual mode formula mobile radio terminal which comes to have mobile satellite communication terminal capabilities and ground wave move terminal capabilities The main part terminal section which comes to have the mobile satellite communication terminal capabilities except the voice transducer which contains the key stroke section, a display, a microphone, and a loudspeaker at least, It has the ground wave personal digital assistant section which comes to have the ground wave move terminal capabilities which are equipped with the voice transducer containing the aforementioned key stroke section, a display, a microphone, and a loudspeaker, and are made into the purpose. While preparing the engagement crevice and engagement heights which connect between the sections mechanically in the aforementioned end of ends in each terminal section The dual mode formula mobile radio terminal characterized by the voice transducer which contains the key stroke section, the display, microphone, and loudspeaker by the side of the ground wave personal digital assistant section at the time of the aforementioned connection, and the mobile satellite communication terminal-capabilities section by the side of the main part terminal section preparing the connector area connected electrically in each terminal section.

[Claim 2] The dual mode formula mobile radio terminal according to claim 1 with which the engagement section which the number of the connector areas which perform the aforementioned electrical installation is one, and performs mechanical connections is characterized by preparing more than one so that adjustable may be possible for the engagement width of face.

[Claim 3] The dual mode formula mobile radio terminal according to claim 1 characterized by arranging the connector area which performs electrical installation to the termination side of the move shaft orientations of the aforementioned engagement section, and arranging the aforementioned connector area on the position regulation side of the aforementioned move shaft while forming the engagement section which performs the aforementioned mechanical connections in the shape of [which can move to predetermined shaft orientations] a rail.

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